US EPA Region 5

andeavor

St. Paul Park Refining Co. LLC
301 St. Paul Park Road
St. Paul Park, MN 55071

651 459 9771
andeavor.com

VIA CERTIFIED MAIL NO: 9171 9690 0935 0093 2029 51

August 30, 2017

AQ Compliance Tracking Coordinator
Industrial Division
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

RE: Updated Notification of Compliance Status for Fluidized Catalytic Cracking Unit under 40 CFR 63 Subpart UUU

Dear Sir or Madam:

St. Paul Park Refining Co. LLC (SPPRC) – St. Paul Park, Minnesota, Refinery submits this updated Notification of Compliance Status (NOCS) for the fluidized catalytic cracking unit (FCCU) provisions required by 40 CFR 63 Subpart UUU. The U.S. Environmental Protection Agency (USEPA) promulgated amendments to Refinery MACT 2 (40 CFR 63 Subpart UUU) pursuant to the Petroleum Refinery Sector Risk and Technology Review, published in the Federal Register on December 1, 2015 (80 CF 75242). The amendment to the rule included alternative operating limits and monitoring requirements during periods of startup, shutdown and hot standby for FCCUs, new operating limits for FCCUs, and new continuous parameter monitoring system (CPMS) requirements.

This NOCS is submitted pursuant the requirements of 40 CFR 63.1574(a)(3) and Table 42 of Subpart UUU. An NOCS report is due within 30 days after the compliance date, which for the amended FCCU requirements became effective as of August 1, 2017. SPPRC is providing an update only for the new operating limits and monitoring requirements established under the amendments to Subpart UUU, which are described as follows for the FCCU:

Fluidized Catalytic Cracking Unit (FCCU)

- Maintain the opacity from the catalyst regenerator vent no greater than 20% on a 3-hour rolling average as required for sources subject to the NSPS Subpart J compliance option.
- Elect to comply with the emission and operating limits of §63.1564(a)(1) and (2) or maintain the inlet velocity for the primary internal cyclones of the catalyst regenerator at or above 20 feet per second during periods of startup, shutdown and hot standby.
- Elect to comply with the emission and operating limits of §63.1565(a)(1) and (2) or maintain the oxygen concentration in the vent gas from the catalyst regenerator at above 1 volume percent on a dry basis during startup, shutdown and hot standby.

- Comply with the new installation, operation, and maintenance requirements of Table 41 of Subpart UUU for affected source CPMSs. The effective compliance date of the CPMS requirements is August 1, 2018 per the approved extension request granted by MPCA after discussions with US EPA on May 17, 2017.

Although there are no new initial compliance demonstrations as a result of the amendments to Subpart UUU, there are new operating limits and monitoring options for continuous compliance demonstration; therefore, the affected source operation, maintenance, and monitoring (OMM) plan is required to be updated. Changes to the OMM plan are required to be submitted to the permitting authority (MPCA) along with the NOCS, in accordance with the provisions of 40 CFR 63.1574(f)(1). Therefore, the updated OMM plan for the FCCU is enclosed within this NOCS submittal. The OMM plan details the procedures that will be followed to demonstrate continuous compliance and include the information required by 40 CFR 63.1574(f)(2) and Table 42 of Subpart UUU.

If you have any questions regarding this notification or the enclosed OMM plan, please contact me.

Sincerely,

Kirby Dahlquist

Kirby Dahlquist
Environmental Engineer

I certify under penalty of law that, based on information and belief formed after reasonable inquiry, the statements and information contained or referenced in this document are true, accurate, and complete.

St. Paul Park Refining Co. LLC

Richard Hastings

Richard Hastings, Vice President and Refinery Manager

8/31/2017

Date

cc: Jennifer Carlson, MPCA

Certified Mail No.: 9171 9690 0935 0093 2029 82
Director – Air and Radiation Division
U.S. EPA, Region 5
77 West Jackson Blvd. (AE-17J)
Chicago, IL 60604

Attachments: Operation, Maintenance and Monitoring Plan (OMMP) Catalytic Cracking Unit

Operation, Maintenance and Monitoring Plan (OMMP)

Catalytic Cracking Unit

St. Paul Park Refining Co. LLC (SPPRC)

August 2017

1.0 INTRODUCTION

An Operation, Maintenance and Monitoring Plan (OMMP) is required by 40 CFR 63, Subpart UUU, National Emission Standards for Hazardous Air Pollutants for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units. The Subpart UUU Final Rule was published in the Federal Register April 11, 2002. The Subpart UUU Final Rule revised and was published in the Federal Register December 1, 2015, and as amended on July 13, 2016.

Affected facilities under Subpart UUU are:

- The process vent or group of process vents on fluidized catalytic cracking units that is associated with regeneration of the catalyst used in the unit (i.e., the catalyst regeneration flue gas vent);

- The process vent or group of process vents on catalytic reforming units (including but not limited to semi-regenerative, cyclic, or continuous processes), that is associated with the regeneration of the catalyst used in the unit. This affected source includes vents that are used during the unit depressurization, purging, coke burn, and catalyst rejuvenation;

- The process vent or group of process vents, that vents from a Claus or other sulfur recovery plant unit or the tail gas treatment units serving sulfur recovery plants, that are associated with sulfur recovery;

- Each bypass line serving a new, existing, or reconstructed catalytic cracking unit, catalytic reforming unit, or sulfur recovery unit. This means each vent system that contains a bypass line (e.g. ductwork) that could divert an affected vent stream away from a control device used to comply with the requirements of this subpart.

According to the rule, the purpose of the plan is to detail the operation, maintenance, and monitoring procedures that will be followed. The plan is submitted to the

permitting authority for review with the notification of compliance status. Once approved, changes to the plan will be submitted to the permitting agency and the facility continues to implement the original approved plan until the changes are approved. Prior to initial approval, amendments to the plan will be submitted and implemented upon submittal. A plan revision log will be maintained and is attached as Appendix A.

Table 1-1 lists the requirements for the OMMP pertaining to all Subpart UUU affected facilities

Table 1-1 OMMP Minimum Requirements for all Affected Facilities

Citation	OMMP Requirement
63.1574(f)(2)(i)	Process and control device parameters to be monitored for each affected source, along with established operating limits.
63.1574(f)(2)(ii)	Emissions, process and control device monitoring procedures for each affected source
63.1574(f)(2)(iii)	Coke burn-rate determination procedures. Volumetric flow rate determination procedures (if process data rather than direct measurement is used). Liquid or solid fossil fuel rate of combustion determination procedures if an incinerator-waste heat boiler is used to burn the exhaust gases from the catalyst regenerator
63.1574(f)(2)(iv)	Equilibrium catalyst nickel concentration procedures and analytical methods Equilibrium catalyst nickel concentration monthly rolling average calculation procedure Nickel operating value hourly and hourly average calculation procedure *(Note: In addition to hourly average, the daily average nickel operating value calculation is also required in Table 7)*
63.1574(f)(2)(v)	Procedures to determine the pH of the water (or scrubbing liquid) exiting a wet scrubber procedures, if you use pH strips
63.1574(f)(2)(vi)	HCl concentration determination procedure when using a colormetric tube sampling system, including procedure correcting for pressure (if applicable) and sampling locations - from catalytic reforming unit
63.1574(f)(2)(vii)	Gas flow rate determination procedure if the alternative procedure based on air flow rate and temperature is used – catalytic cracking units *Note: an alternative gas flow rate determination is also allowed for catalytic reforming units*
63.1574(f)(2)(viii)	Monitoring schedule – when affected source will be monitored and when it will not be monitored (e.g., during the coke burn-off, regeneration process at CRU)
63.1574(f)(2)(ix)	Quality control plan for each continuous opacity monitoring system and continuous emission monitoring system, including procedures for calibrations, relative accuracy audits and adjustment needed to meet applicable requirements for the system

Table 1-1 OMMP Minimum Requirements for all Affected Facilities (continued)

Citation	OMMP Requirement
63.1574(f)(2)(x)	Maintenance schedule for each monitoring system, that is generally consistent with the manufacturer's instructions for routine and long-term maintenance
	Maintenance schedule for each control device, that is generally consistent with the manufacturer's instructions for routine and long-term maintenance
63.1574(f)(2)(xi)	Corrective action procedure specifying monitoring frequency subsequent to the repeat monitoring (if HCl concentration within the bed exceeds the operating limit) and prior to the sorbent material replacement - fixed-bed gas-solid adsorption system from a catalytic reforming unit.
63.1574(f)(2)(xii)	Catalyst purging procedures (minimum catalyst temperature, minimum cumulative volume of gas per mass of catalyst used, maximum purge gas temperature, specification of monitoring systems) - catalytic reforming unit with no control device for Organic HAP emissions.
Not specifically required	Procedures to determine the alkalinity of water by titration used in catalytic reforming units as an alternative to pH monitoring (alternative monitoring plan required).

The General Provisions of 40 CFR Subpart 63 define "Monitoring" as the collection and use of measurement data or other information to control the operation of a process or pollution control device, or to verify a work practice standard relative to assuring compliance with applicable standards. The definition also indicates that monitoring is composed of four elements: (1) Indicator(s) of performance, (2) Measurement technique, (3) Monitoring frequency, (4) Averaging time. The details provided within the definition of the four elements of monitoring are attached in Appendix B. The four elements of monitoring form the basis of the monitoring procedures in this plan.

This plan outlines operation, maintenance and monitoring procedures during periods of normal operation, startup, shutdown and hot-standby.

1.1 AFFECTED FACILITIES

This OMMP covers the affected facilities listed in Table 1-2. The table indicates the Unit number, Unit name, Type of Unit or Bypass Line, Control Equipment, Limitation Option Selected, UUU Citation and Title V Permit Citation.

1.2 PERMIT DEVIATIONS

The duty to prepare and implement the OMMP is included in the Part 70 (Title V) Permit. The following events would be considered deviations of the Title V Permit.

- Failure to prepare the OMMP
- Failure to submit the OMMP for review and approval with the notification of compliance status
- Failure to implement the OMMP
- Implementing amendments to the OMMP prior to agency approval

Note, the plan can be amended and the revisions can be implemented immediately while awaiting the agency approval. Any such amendments will be promptly submitted to the agency.

Table 1-2 List of Affected Facilities (Example)

Unit Number	Unit Name	Unit Type	Type/Control Equipment	Option	Subpart UUU Citation to prepare and operate at all times according to the plan	Title V Permit Citation
8	FCC	Existing Catalytic Cracking	TREA17 Centrifugal Collector – medium Efficiency (and Multi Stage Separator)	Current compliance options: **Metal HAP**: Subject to NSPS for PM in 40 CFR 60.102- < 30% Opacity 6-minute average, except for one six-minute average opacity reading in any one hour period. **Alternative Operating Limit metal HAP** for inlet velocity to the primary internal cyclones of the catalytic cracking unit catalyst regenerator at or above 20 feet per second 63.1564(a)(5)(ii) <20% 3-hour rolling average opacity limit for the NSPS J compliance option Table 2 to Subpart UUU Organic HAP – non-NSPS-CO less than 500 ppm by volume (dry basis). §60.103 **Alternative operating limit Organic HAP** maintain the oxygen (O2) concentration in the exhaust gas from your catalyst regenerator at or above 1 volume percent (dry basis) 63.1565(a)(5)(ii)	63.1564(a)(3) 63.1565(a)(3) Table 2 to Subpart UUU 63.1565(a)(1)(ii) 63.1565(a)(5)(ii)	EQUI2

2.0 CATALYTIC CRACKING OMMP

2.1 PROCESS DESCRIPTION

Unit 8 is approximately 30,500 bpd fluidized catalytic cracking unit. The materials from the FCC are routed to the FCC column for fractionation.

2.2 40 CFR 63, SUBPART UUU (REFINERY MACT II) COMPLIANCE OPTIONS

The Subpart UUU limitations for catalytic cracking unit regenerators address both metal HAP and organic HAP. Table 1-2 summarizes the compliance options selected by the refinery. The metal HAP limit is 0.029 lbs Ni/hr for Option 3. The refinery will initially complied with the Option 3 metal HAP limit then the NSPS PM metal HAP limit per NSR Consent Decree. The refinery's compliance date for the NSPS PM metal HAP limit is December 31, 2007. The NSPS metal HAP limit is 1.0 lbs PM/1,000 lb coke burned and 30% opacity. The NSR Consent Decree metal HAP limit is 0.9 lbs PM/1,000 lb coke burn off. During startup, shutdown and hot standby the alternative metal HAP limit is provided specified in 63.1564(a)(5)(i) and/or 63.1564(a)(5)(ii). Additionally, Table 2 to Subpart UUU of Part 63 requires that on and after August 1, 2017, SPPRC must maintain the 3-hour rolling average opacity of emissions from the catalyst regenerator vent no higher than 20 percent.

The Organic HAP limitation for units subject to the NSPS for carbon monoxide (40 CFR 60.103) is 500 parts per million volume of CO, dry basis. During startup, shutdown and hot standby the organic HAP limit is provided as an alternative limit specified in one of 63.1564(a)(5)(i) and/or 63.1564(a)(5)(ii).

2.3 OPERATION, MAINTENANCE AND MONITORING PLAN - UNIT 8

The attached OMMP FCC Detail Sheet includes the OMMP information for Unit 8. The Detail Sheet is divided into the following sections:

Section 1: Source Type, Configuration, Control Equipment, and Compliance Options

Section 2: Monitoring Systems (Opacity, Parameter, Emission)

Section 3: Monitoring Elements: Indicator, Measurement Technique, Frequency, Averaging Time

Section 4: Monitoring Schedule

Section 5: Procedures: Calculations and Other Measurements

Section 6: Monitoring System and Control Device Maintenance

Section 7: Bypass Lines

The location of any additional supporting documentation is listed on the Detail Form.

Appendix A
OMMP Revision Log

Section(s) Affected	Description of Change	Date submitted to permitting agency	Date approval received from permitting agency	Date plans updated/ distributed
All	Revision 1: Original Plan	8/18/05	Approval not received	4/05
Section 3 of Detail Sheet	Revision 2: Changed Ni operating limit	12/19/05 cover letter date	Approval not received	12/05
All	Revision 2: Changed company name	12/19/05 cover letter date	Approval not received	12/05
Section 2, Table 1-2, All, Appendix C	Revision 3: Updated compliance option, compliance date and FCC capacity, added document control header, added FSS bypass line monitoring requirements	5/9/08 cover letter date	Approval not received	12/07
All	Completed periodic review – no changes required	NA	NA	1/13
All	Revision 4: Completed review and updated for Refinery Sector Rule	8/30/17 cover letter date	TBD	8/17

Appendix B

Four Elements of Monitoring for 40 CFR Subpart 63
40 CFR 63, Subpart A, General Provisions (63.2)

What? Indicator(s) of performance - the parameter or parameters you measure or observe for demonstrating proper operation of the pollution control measures or compliance with the applicable emissions limitation or standard.	Indicators may include: Direct emission measurement Predicted emission measurements Operational parametric value that correspond to process or control device (and capture system) efficiencies or emission rates Recorded findings of inspection of work practice activities, material tracking or design characteristics. Expressed as: Single values (maximum, minimum) Function of process variables (e.g. range of pressure drop) Particular operational or work practice standard or work practice status Interdependency between two or more variables
How? Measurement techniques - means by which you gather and record information of or about the indicators of performance	Examples: CEM Systems COM Systems CPM Systems Manual Inspections of process conditions or work practices (including recordkeeping) Includes: Detector type Location and installation specs Inspection procedures QA/QC
How Often? Monitoring frequency - number of times you obtain and record monitoring data over a specified time interval	Examples: At least 4 points equally spaced for each hour At least every 10 seconds At least once per operating day (or week, month, etc.)
Averaging Time? Period over which you average and use data to verify proper operation of the pollution control approach or compliance with the emissions limitation or standard.	Examples: 3-hour average 30-day rolling average Daily average Instantaneous alarm

Appendix C
OMMP FCC Detail Sheets

Section 1: Source Type, Configuration, Control Equipment, and Compliance Options

Source Name:	St. Paul Park Refining Co. LLC
Source Location:	St. Paul Park, Minnesota
Unit ID No.:	8
Unit capacity:	30,500 bpd
Unit Type:	Fluidized Catalytic Cracking
Unit configuration:	❑ Internal cyclone (no add-on particulate control) ❑ ESP ❑ Wet Scrubber ❑ Baghouse ❑ CO Boiler ❑ Boiler or Process Heater (for CO Control) ❑ Thermal Incinerator (for CO Control) ❑ Flare (for CO control) ☒ Multistage separator with fourth stage separator
Metal HAP Compliance Option	☒ NSPS - subject to PM standard in 40 CFR 60.102 (< 30% Opacity 6-minute average, except for one six-minute average opacity reading in any one hour period) and Table 2 of Subpart UUU- On and after August 1, 2017, SPPRC must maintain the 3-hour rolling average opacity of emissions from your catalyst regenerator vent no higher than 20 percent. During startup, shutdown and hot standby the metal HAP limit is provided as an alternative limit specified in one of 63.1564(a)(5)(i) and or 63.1564(a)(5)(ii). Additionally, in accordance with 63.1571(a)(5) conduct a periodic performance test for PM for each catalytic cracking unit at least once every 5 years according to the requirements in Table 4 of this subpart or annually if you comply with the emission limits in Item 1 (NSPS subpart J) in Table 1 of this subpart and the PM emissions measured during the most recent performance source test are greater than 0.80 lb/1000 lb coke burn-off. During startup, shutdown and hot standby the an alternative metal HAP limit is provided specified in 63.1564(a)(5)(ii) to maintain primary inlet cyclone velocity greater than 20 ft/second. Option 1: Elect NSPS (not subject to PM standard in 40 CFR 60.102) ❑ Option 2: PM Limit (not subject to PM standard in 40 CFR 60.102) ❑ Option 3: Ni lb/hr limit (not subject to PM standard in 40 CFR 60.102)

	☐ Option 4: Ni lb/1000 lb coke burn-off (not subject to PM standard in 40 CFR 60.102)
Organic HAP Compliance Option	☒ NSPS - Subject to CO standard in 40 CFR 60.103 During startup, shutdown and hot standby, the metal HAP limit is provided as an alternative limit specified in one of 63.1565(a)(5)(i) and or 63.1565(a)(5)(ii). ☐ Not subject to CO standard in 40 CFR 60.103

Section 2: Monitoring Systems (Opacity, Parameter, Emission)

Metal HAP	Required Monitoring
NSPS - Any size, ESP or No Control Option 1 - Any size, ESP, Scrubber or No Control Option 2 - Any size, ESP or no control Option 3 - Any size no control, with ESP Fresh Feed Capacity > 20,000 bpd, if elected with ESP < 20,000 bpd Option 4 - Any size no control, with ESP Fresh Feed Capacity > 20,000 bpd, if elected with ESP < 20,000 bpd	☒ Opacity (NSPS < 30% Opacity 6-minute average, except for one six-minute average opacity reading in any one hour period); <20% 3-hour rolling average opacity; and as an alternative during startup, shutdown and hot standby maintain primary inlet cyclone velocity greater than 20 ft/second. Further, periodic PM performance testing is required to verify compliance with PM limit of 0.9 lb/1000 lb coke burn.
Any option, any size with Wet Scrubber Continuous parameter monitoring system Pressure drop is not required for non-venturi jet ejector design	☐ Pressure drop ☐ Gas flow rate (entering and exiting) ☐ Total liquid flow rate ☐ Alternative gas flow rate 63.1573(a)(1) ☐ Alternative gas flow rate 63.1573(a)(2)
ESP Fresh Feed Capacity < 20,000 bpd	☐ Gas Flow rate (entering and exiting) ☐ Voltage and secondary current, or ☐ Total Power Input ☐ Alternative gas flow rate 63.1573(a)(1) ☐ Alternative gas flow rate 63.1573(a)(2)
Any of the above and baghouse	☐ Alternate parameter or continuous emission monitoring system other than those specified (63.1573(d) - Administrator approval required)

Organic HAP	Required Monitoring
NSPS	☒ CO CEM, by volume, dry basis and alternatively O2 CEM, by volume, dry basis during periods of startup, shutdown and hot standby in accordance with MACT UUU.
Not NSPS	☐ CO CEM, by volume, dry basis
Not NSPS – Thermal Incinerator	☐ CO CEM, by volume, dry basis, or ☐ Continuous system to measure and record the combustion zone temperature and oxygen content (% dry basis) in the incinerator vent stream.
Not NSPS – Process heater or boiler with a design heat input capacity under 44 MW or process heater or boiler in which all vent streams are not introduced into the flame zone	☐ CO CEM, by volume, dry basis, or ☐ Continuous system to measure and record the combustion zone temperature and oxygen content (% dry basis) in the incinerator vent stream.
Not NSPS - Flare	☐ Monitoring device such as a thermocouple, an ultraviolet beam sensor, or infrared sensor to continuously detect the presence of a pilot flame
Not NSPS – No control device	☐ CO CEM, by volume, dry basis
Any of the above	☐ Alternate parameter or continuous emission monitoring system other than those specified (63.1573(d) – Administrator approval required)

Section 3: Monitoring Elements: Indicator, Measurement Technique, Frequency, Averaging Time

Opacity

3-1-1 Indicator of Performance

Can include: *Direct emission measurement or predicted emission measurements (including opacity)*
Operational parametric value that correspond to process or control device (and capture system) efficiencies or emission rates
Recorded findings of inspection of work practice activities, material tracking or design characteristics.

Expressed as: *Single values (maximum, minimum)*
Function of process variables (e.g. range of pressure drop)
Particular operational or work practice standard or work practice status
Interdependency between two or more variables

Indicator of performance: Opacity
Value/Range/Standard: At or below 30% on a 6-minute average, except for one 6-minute average opacity reading in any 1-hour. Also, at or below 20% on a 3-hour average
Any referenced or attached documents: None

3-1-2 Measurement Technique

Examples: *Continuous Emission Monitoring System (CEMS)*
Continuous Opacity Monitoring System (COMS)
Continuous Parameter Monitoring System (CPMS)
Manual Inspections of process conditions or work practices (including recordkeeping)

Detector type: Opacity data will be obtained using the existing COMs.
Location and installation specifications: The COMs is located on FCC flue gas stack
Inspection procedures: Continuous read-out of opacity is in the control room

QA/QC: For the COMs, Per Performance Specification 1 of 40 CFR 60. Daily calibration drifts are performed. A three point calibration error audit is conducted once every four calendar quarters, at least 3 months apart, but no more than 8 months apart), except when the emission unit is not operating during the semiannual period. One quarterly audits will be conducted by an independent test firm, the other 3 quarterly audits will be conducted by the SPPRC Instrumentation Department.
Recordkeeping type/location: Data management system.
Any referenced or attached documents: NA

3-1-3 Monitoring Frequency

Examples: *At least 4 points equally spaced for each hour for CEMS or CPMS*
At least every 10 seconds for COMS
At least once per operating day (or week, month, etc.) for work practice or design inspections

Monitoring Frequency: Opacity: a minimum of one cycle of sampling and analyzing for each successive 10-second period and one cycle of data recording for each successive 6-minute period.

Any referenced or attached documents: NA

3-1-4 Averaging Time

Examples: *3-hour average, 30-day rolling average, Daily average, Instantaneous alarm*

Averaging Time: 6-minute and 3-hour averages for opacity.
Methodology/Equation: Data acquisition system will collect opacity data and averages will be calculated in spreadsheets or equivalent. The 6-minute averages will begin at the top of the hour (e.g., 00:00 – 06:00).
Any referenced or attached documents: None.

Primary Cyclone Inlet Velocity

3-2-1 Indicator of Performance

Can include: *Direct emission measurement or predicted emission measurements (including opacity)*
Operational parametric value that correspond to process or control device (and capture system) efficiencies or emission rates
Recorded findings of inspection of work practice activities, material tracking or design characteristics.

Expressed as: *Single values (maximum, minimum)*
Function of process variables (e.g. range of pressure drop)
Particular operational or work practice standard or work practice status
Interdependency between two or more variables

Indicator of performance: Inlet velocity to the primary internal cyclones during Periods of Startup Shutdown and Hot Standby ratio from Superficial velocity calculation
Value/Range/Standard: > or equal to 20 feet per second
Any referenced or attached documents: October 2004 EPA Approval for air flow and coke burn calculation used to calculate flue gas volumetric flow rate. This is similar to the alternative provided in 63.1573 except that it also accounts for sulfur and nitrogen balance. The air flow rate is used to subsequently calculate superficial velocity which is then Area ratio'd to obtain the inlet velocity to the primary internal cyclones. The multiplier of the superficial velocity to obtain primary inlet velocity is 18.1. The velocity calculation depends on CEM measurements for CO, CO2, SO2, NOx, and O2 as well as process instrumentation.

3-2-2 Measurement Technique

Examples: *Continuous Emission Monitoring System (CEMS)*
Continuous Opacity Monitoring System (COMS)
Continuous Parameter Monitoring System (CPMS)
Manual Inspections of process conditions or work practices (including recordkeeping)

Detector type: Process instruments
Location and installation specifications: On FCC flue gas stack
Inspection procedures: Continuous read-out in the control room
QA/QC: Per Performance Specification 3 and Appendix F of 40 CFR 60. Daily calibration drifts, quarterly cylinder gas audit (CGA), and annual relative accuracy test audit (RATA). Cylinder gas audits are conducted in accordance with applicable methods in three of four quarters but in no more than three quarters in succession unless a RATA is conducted. (A Relative Accuracy Test Audit is conducted in the one quarter of four successive quarters that a cylinder gas audit is not conducted or more frequently if desired.).
Recordkeeping type/location: Data Management System
Any referenced or attached documents: NA

3-2-3 Monitoring Frequency

Examples: *At least 4 points equally spaced for each hour for CEMS or CPMS*
At least every 10 seconds for COMS
At least once per operating day (or week, month, etc.) for work practice or design inspections

Monitoring Frequency: Minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period.
Any referenced or attached documents: None

3-2-4 Averaging Time

Examples: *3-hour average, 30-day rolling average, Daily average, Instantaneous alarm*

Averaging Time: Hourly average
Methodology/Equation: Hourly average (e.g. 0000 - 0100). The hourly average is computed from four or more data points equally spaced over each 1-hour period, except during periods when calibration, quality assurance, or maintenance activities are being performed.
Any referenced or attached documents: 40 CFR 63.8(g), 40 CFR 63.10(b)(2)(vii)(A or B), 40 CFR 63.2

Carbon Monoxide

3-3-1 Indicator of Performance

Can include: *Direct emission measurement or predicted emission measurements (including opacity)*
Operational parametric value that correspond to process or control device (and capture system) efficiencies or emission rates
Recorded findings of inspection of work practice activities, material tracking or design characteristics.

Expressed as: *Single values (maximum, minimum)*
Function of process variables (e.g. range of pressure drop)
Particular operational or work practice standard or work practice status
Interdependency between two or more variables

Indicator of performance: CO
Value/Range/Standard: Below 500 ppmv, dry basis (hourly average)
Any referenced or attached documents: None

3-3-2 Measurement Technique

Examples: *Continuous Emission Monitoring System (CEMS)*
Continuous Opacity Monitoring System (COMS)
Continuous Parameter Monitoring System (CPMS)
Manual Inspections of process conditions or work practices (including recordkeeping)

Detector type: CEMS
Location and installation specifications: On FCC flue gas stack
Inspection procedures: Continuous read-out in the control room

QA/QC: Per Performance Specification 4 and Appendix F of 40 CFR 60. Daily calibration drifts, quarterly cylinder gas audit (CGA), and annual relative accuracy test audit (RATA). Cylinder gas audits are conducted in accordance with applicable methods in three of four quarters but in no more than three quarters in succession unless a RATA is conducted. (A Relative Accuracy Test Audit is conducted in the one quarter of four successive quarters that a cylinder gas audit is not conducted or more frequently if desired.).

Recordkeeping type/location: Data Management System

Any referenced or attached documents: NA

3-3-3 Monitoring Frequency

Examples: *At least 4 points equally spaced for each hour for CEMS or CPMS*
At least every 10 seconds for COMS
At least once per operating day (or week, month, etc.) for work practice or design inspections

Monitoring Frequency: Minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period.
Any referenced or attached documents: None

3-3-4 Averaging Time

Examples: *3-hour average, 30-day rolling average, Daily average, Instantaneous alarm*

Averaging Time: Hourly average

Methodology/Equation: Hourly average (e.g. 0000 - 0100). The hourly average is computed from four or more data points equally spaced over each 1-hour period, except during periods when calibration, quality assurance, or maintenance activities are being performed.

Any referenced or attached documents: 40 CFR 63.8(g), 40 CFR 63.10(b)(2)(vii)(A or B), 40 CFR 63.2

Oxygen

3-4-1 Indicator of Performance

Can include: *Direct emission measurement or predicted emission measurements (including opacity)*
Operational parametric value that correspond to process or control device (and capture system) efficiencies or emission rates
Recorded findings of inspection of work practice activities, material tracking or design characteristics.

Expressed as: *Single values (maximum, minimum)*
Function of process variables (e.g. range of pressure drop)
Particular operational or work practice standard or work practice status
Interdependency between two or more variables

Indicator of performance: O2 during Periods of Startup Shutdown and Hot Standby
Value/Range/Standard: > or equal to 1%, dry basis (hourly average)
Any referenced or attached documents: None

3-4-2 Measurement Technique

Examples: *Continuous Emission Monitoring System (CEMS)*
Continuous Opacity Monitoring System (COMS)
Continuous Parameter Monitoring System (CPMS)
Manual Inspections of process conditions or work practices (including recordkeeping)

Detector type: CEMS
Location and installation specifications: On FCC flue gas stack
Inspection procedures: Continuous read-out in the control room
QA/QC: Per Performance Specification 3 and Appendix F of 40 CFR 60. Daily calibration drifts, quarterly cylinder gas audit (CGA), and annual relative accuracy test audit (RATA). Cylinder gas audits are conducted in accordance with applicable methods in three of four quarters but in no more than three quarters in succession unless a RATA is conducted. (A Relative Accuracy Test Audit is conducted in the one quarter of four successive quarters that a cylinder gas audit is not conducted or more frequently if desired.).
Recordkeeping type/location: Data Management System
Any referenced or attached documents: NA

3-4-3 Monitoring Frequency

Examples: *At least 4 points equally spaced for each hour for CEMS or CPMS*
At least every 10 seconds for COMS
At least once per operating day (or week, month, etc.) for work practice or design inspections

Monitoring Frequency: Minimum of one cycle of operation (sampling, analyzing, and data recording) for each successive 15-minute period.
Any referenced or attached documents: None

3-4-4 Averaging Time

Examples: *3-hour average, 30-day rolling average, Daily average, Instantaneous alarm*

Averaging Time: Hourly average
Methodology/Equation: Hourly average (e.g. 0000 - 0100). The hourly average is computed from four or more data points equally spaced over each 1-hour period, except during periods when calibration, quality assurance, or maintenance activities are being performed.
Any referenced or attached documents: 40 CFR 63.8(g), 40 CFR 63.10(b)(2)(vii)(A or B), 40 CFR 63.2

Section 4: Monitoring Schedule

	Monitoring Schedule
Metal HAP (Opacity and primary cyclone inlet velocity	☒ Continuously when FCC is in operation
Organic HAP (Carbon Monoxide and Oxygen)	☒ Continuously when FCC is in operation

Section 5: Procedures: Calculations and Other Measurements

Metal HAP	Required Calculations
NSPS	☒ Daily average coke burn-off rate – Equation 1 63.1564 and/or EPA method approved for site in October 2004. ☒ Hours of operation of catalyst regenerator ☐ PM contribution if burning liquid or solid fossil fuel ☐ Hours of operation of fuel combustion ☒ Six-minute average opacity and 3-hour average opacity and as an alternative hourly average primary cyclone inlet velocity during periods of startup, shutdown and hot standby.
Option 1: Elect NSPS	☐ Daily average coke burn-off rate – Equation 1 63.1564 ☐ Hours of operation of catalyst regenerator ☐ PM contribution if burning liquid or solid fossil fuel ☐ Hours of operation of fuel combustion ☐ Six-minute average opacity

Metal HAP	Required Calculations
Option 2: PM Limit	☐ Daily average coke burn-off rate – Equation 1 63.1564 ☐ Hours of operation of catalyst regenerator ☐ Process data to determine volumetric flow rate ☐ Hourly and daily average gas flow rate – ESP ☐ Hourly average opacity ☐ Hourly and daily average voltage and secondary current (or total power input) – ESP ☐ Hourly and daily average pressure drop, gas flowrate, liquid flow rate – wet scrubber ☐ Daily average liquid to gas ratio – wet scrubber
Option 3: Ni lb/hr limit	☐ Hourly average opacity ☐ Equilibrium catalyst Ni concentration (weekly) ☐ Hourly average gas flow rate ☐ Hourly average Ni operating value – Equation 11 63.1564 ☐ Daily average Ni operating value ☐ Monthly rolling equilibrium catalyst Ni concentration – if ESP(1) ☐ Hourly and daily average gas flow rate – ESP ☐ Hourly and daily average voltage and secondary current (or total power input) – ESP ☐ Hourly and daily average pressure drop, gas flowrate, liquid flow rate – wet scrubber ☐ Daily average liquid to gas ratio – wet scrubber

Option 4: Ni lb/1000 lb coke burn-off	❑ Hourly average opacity ❑ Equilibrium catalyst Ni concentration (weekly) ❑ Hourly average gas flow rate ❑ Hourly average Ni operating value – Equation 12 63.1564 ❑ Daily average coke burn-off rate – Equation 1 63.1564 ❑ Daily average Ni operating value ❑ Monthly rolling equilibrium catalyst Ni concentration – if ESP ❑ Hourly and daily average gas flow rate – ESP ❑ Hourly and daily average voltage and secondary current (or total power input) – ESP ❑ Hourly and daily average pressure drop, gas flowrate, liquid flow rate – wet scrubber ❑ Daily average liquid to gas ratio – wet scrubber
Any of the above	☒ Automated data compression system (63.1573(c) – permitting authority approval required)

Organic HAP	Required Calculations
NSPS Not NSPS – Elect CEM	☒ Hourly average CO concentration and as an alternative hourly average O2 concentrations during periods of startup, shutdown and hot standby.
Not NSPS – Thermal Incinerator	❑ Hourly and daily average temperature ❑ Hourly and daily average oxygen content ❑
Not NSPS – Process heater or boiler with a design heat input capacity under 44 MW or process heater or boiler in which all vent streams are not introduced into the flame zone	❑ Hourly and daily average temperature
Not NSPS - Flare	❑ Record data for presence of pilot for each 1-hour period
Any of the above	❑ Automated data compression system (63.1573(c) – permitting authority approval required)

Section 6: Monitoring System and Control Device Maintenance

Monitoring System/ Control Device	Maintenance
Opacity Monitor, CO CEM	Preventive maintenance inspections are performed daily. In the event repairs are necessary, the repairs are made in accordance with the manufacturer's recommendations and are usually completed on-site by facility personnel; however, should a repair require additional resources, the manufacturer or other off-site personnel are contacted for assistance. Records of maintenance and inspections are maintained by the refinery. The monitors are observed daily to ensure that they are operating properly including correctly performing zero and calibration drift checks. Calibration cylinders and filters are replaced as necessary.
MSS/FSS	The FCC utilizes a UOP-designed Multi-Stage Separator (MSS)/Fourth Stage Separator (FSS) system to control PM emissions from the FCC regenerator. All of the FCC regenerator off-gas is directed to the MSS. Approximately 90% of the total gas stream from the MSS is directed to the FCC main stack. The remaining 10%, commonly referred to as underflow, is directed to the FSS. After passing through the FSS, the gas stream is recombined with the MSS gas flow in the FCC main stack. The MSS utilizes two sets of separators, an upper (stage 1) and a lower (stage 2). The flue gas exiting stage 1 will enter FSS F50 for further separation. The flue gas exiting stage 2 will enter FSS F49 for further separation. In addition, a portion of the flue gas exiting the MSS will go directly to the stack. From time-to-time, each FSS will be shutdown to perform maintenance activities (e.g., replace/repair filters). During this shutdown, the FCCU will continue to operate and the other FSS will remain in operation. The refinery's startup, shutdown, and malfunction plan will be followed during these FSS maintenance activities. In addition, maintenance of the control device will be conducted per schedules/intervals defined the refinery's Process Safety Management and Chemical Accident Prevention Mechanical Integrity Program. The purpose of this program is to develop an ongoing equipment integrity philosophy that ensures process equipment and components are designed, constructed, installed and maintained to minimize the risk of hazardous releases. It is intended to provide a single-source reference for identifying written procedures and training programs for conducting

	and documenting equipment inspections and tests and for documenting quality assurance. This program will consider nationally recognized standards and good engineering practices to ensure the integrity of equipment is maintained. This program may be used in conjunction with other programs at the St. Paul Park Refinery. Selection of the covered equipment will be based on guidelines that have been developed for each type of major equipment. Major equipment types include: ❑ Pressure Vessels ❑ Rotating Equipment ❑ Storage Tanks (those connected to a covered process) ❑ Emergency Shutdown Systems ❑ Piping Systems and Components ❑ Relief and Vent Systems and Devices ❑ Controls (including monitoring devices and sensors, alarms and interlocks) ❑ Electrical ❑ Safety Equipment

Section 7: Bypass Lines

Per 63.1562 (f) (4), Subpart UUU does not apply to equipment associated with bypass lines such as low leg drains, high point bleed, analyzer vents, open-ended valves or lines, or pressure relief valves needed for safety reasons.

For PM, there are no identified scenarios that bypass flue gas away from the MSS/FSS flue gas stack and thus not monitored with the COMs.

Since there is no add-on control devices (defined in 63.1579) for CO control, bypass line requirements do not apply for CO. Compliance can be maintained by utilizing supplemental oxygen to maintain complete combustion in the FCCU.